

Insects

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INDIAN MUSEUM NOTES.

VOLUME V.—No. 3.

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5.—REMARKS ON INDIAN SCALE INSECTS (COCCIDÆ), WITH DESCRIPTIONS OF NEW SPECIES.

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PART II.

(With Plates XVIII, XIX and XX.)

The following notes are in continuation of my earlier contribution on the subject, in Vol. V, No. 1, of this Journal. Sixteen species, not included in my first list, are now enumerated, bringing up the total number of records to 53, a figure which must still bear but a very small proportion to the number of species occurring on the Indian continent.

With several new collectors in the field, I anticipate the early publication of a third part of these notes.

Aspidiotus (Targionia) glomeratus, sp. nov.

Female puparia crowded and adhering together in such a manner that it is difficult to isolate a single individual. Form irregularly circular, slightly convex. Colour smoky-brown or grayish-black. Pellicles large, shining, black; normally concealed beneath a covering of the fuliginous secretion. Ventral scale whitish, stout, entire. Diameter 2.50 mm.

Male puparium similar to that of female, but much smaller and more oval. Long diameter 1 mm.

Adult ♀ of normal oval form (pl. xviii, fig. 1); cephalothorax evenly rounded, spiracles without parastigmatic glands, surrounded by a concentrically wrinkled area. Pygidium (fig. 1, a) deltoid. Lobes six, prominent, well defined, with evenly rounded edges; the thickened bases extending inwards (fig. 1, b.). Four claviform thickened processes (paraphyses) extending inwards between the lobes, two on each side. Margin beyond the lobes strongly but irregularly serrate. Pectinate squames between the lobes. No circumgenital glands. A strong chitinous bar—interrupted in two places—extending across base of pygidium. Genital aperture anterior to anal. Numerous oval pores, with thickened chitinous rims, on both dorsal and ventral surfaces, connected with long filiform ducts. Length 1.50 to 1.75 mm. Breadth 1.20 to 1.40 mm.

Adult ♂ not observed.

Habitat: Beneath the sheathing bases of leaves of sugarcane (*Saccharum officinale*) in association with *Aclerda japonica*, Newst. Collected by Dr. Geo. Watt (Reg. No. 11830-9). No locality given.

Lecanium imbricans, sp. nov.

Adult ♀ (pl. xviii, fig. 2) very irregular in form owing to the crowded habit of the insects. When separate and examined under pressure, the form appears to be irregularly deltoid, the anterior extremity narrowest. Marginal area flattish: median area irregularly convex. The derm is so densely chitinous that it is extremely difficult to make out the characters. Margin with a close series of pointed spines. I have been unable to detect any stigmatic clefts or stigmatic spines, unless three of the marginal spines grouped together at one point (fig. 2, *a*) represent the latter.

Derm with moderately large polygonal or rounded cells on dorsum, and many conspicuous oval translucent cells on ventral surface, especially towards the dense median area. There are four remarkably large depressed glandular patches on the dorsum, at about equal distances from each other: each patch (fig. 2, *b*) surrounded by a densely chitinous ring, within which is a mass of minute circular pores similar to those composing the circumgenital glands in the *Diaspidinæ*. Anal scales (fig. 2, *c*) with outer edge convex, longer than base, which has a concave outline. Antenna (fig. 2, *d*) apparently 7-jointed, with one or more incomplete joints in the 7th: 1st shortest, 7th longest: formula, 7, 3, 4, 5, 2, 6, 1. Legs small and slender. Foot with 3 simple hair-like digitules, 1 on claw, 2 on tarsus. Length of largest example examined, 12 mm. Breadth, 11 mm.

Habitat: On stem and branches of *Ficus mysorensis*; Nilgiris (coll. Dr. Geo. Watt, No. 14675). Received also from Mr. L. de Nicéville, who quotes, as follows, from his correspondent, Dr. Lehmann, of Mysore: . . . "so far as I have been able to find out, it has only been found on a tree locally known as the 'red cedar' (probably *Erocarpus fraxinifolius*) which is used as a shade for coffee."

A very distinct and interesting species: the comparatively great size (nearly half an inch in diameter) far exceeding that of any other known species. The marginal spines and glandular pits suggest affinity with *L. mirificum*, Mask. The function of these glandular patches is obscure. My specimens do not show any definite waxy or other secretion at these points.

Eriochiton cajani, Mask.(*Indian Museum Notes*, Vol. II, No. 1, p. 59, (1891.)

This species should be removed to the genus *Ceroplastodes*, Cockerell.

Aclerda japonica, Newst.(*Ent. Mo. Mag.* April, 1901.)

Dr. Watt has sent me examples of this species, infesting sugarcane, where it occurs beneath the sheathing bases of the leaves, in company with *Asp. glomeratus*, as described above.

Inglisia bivalvata, sp. nov.

Adult ♀ (pl. XVIII, fig. 3,) oval: strongly convex above, the dorsal area rising steeply into a bicuspid median point. Dorsum completely covered by two glassy shell-like plates meeting along the median longitudinal line. These plates are most delicately fluted in radial curves, the rays meeting at each cusp and are easily separable from the body of the insect. In dried specimens they usually become detached, when they resemble the valves of some minute mollusc. A fragmentary fringe of small glassy plates can often be distinguished at the posterior extremity. Colour of test very pale fulvous or brownish-yellow. Colour of insect brown. Antenna (fig. 3, *a*) small, the joints rather confused: six separate joints distinguishable: two basal joints short and broad, then a long stout joint, almost as long as all the others combined, with one (sometimes two) incomplete divisions: the three terminal joints small and short. Mentum monomeric. Leg (fig. 3, *b*) well developed: tarsus (exclusive of claw) $\frac{2}{3}$ rds length of tibia: ungual digitules broadly dilated; tarsals fine knobbed hairs. Anal aperture (fig. 3, *c*) surrounded by dense chitinous skin: the anal scales widely divergent, triangular, outer edge longer than base, a small tooth-like process on inner edge near apex; anal ring with 6 long stout hairs. Margin of body with a series of sharply-pointed conical spines alternating with an equal number of sessile bilocular pores: both spines and pores communicating, by delicate ducts, with a remarkable system of ramifying vessels (fig. 3, *d*) resembling the circulatory system in higher animals. Slight marginal indentations at the stigmatic regions, marked by slightly

stouter spines. Test, 4 to 5.50 mm. long : 3 to 3.50 mm. broad. Insect 3.50 to 5 mm. long : 2.50 to 3.25 mm. broad.

Adult ♂ not observed.

Male puparium (fig. 3, *e*) a remarkably ornamental object when perfect ; but the waxy laminæ are very brittle and easily detached. Anterior extremity with a single fluted plate marked like the valve of a cockle shell. Median dorsal area occupied by an elongate plate with a prominent central compressed cone surrounded by radiating ribs. Posterior part covered by a large heart-shaped slightly concave plate, forming a valve for the exit of the imago, the apex pointed and cleft, with a median conical prominence and radiating lines. The sides occupied by wing-like laminæ of striated wax, two on each side. The whitish radiating lines and bars give the scale the appearance of being ribbed or fluted : but the surface is in reality quite smooth and glassy, the paler markings lying below this transparent surface. Length, 2 mm.

Habitat: On twigs of *Thespesia populnea* (fig. 3, *f*) : Rameswaram Island, South India.

This insect, in the form of the test, approaches *I. fossilis*, Mask., but differs in the possession of well developed legs.

Tachardia.

It has been customary, in describing species of the genus *Tachardia*, to speak of the "lac-tubes", presuming these organs to be principally concerned in the secretion of the lac with which these insects invest themselves. I believe this to be a mistaken assumption. A study of the early stages of the insect shows that the lac is exuded from the general surface of the skin. It first appears, in the larva, in the form of separate plates on the dorsal surface of the several segments in the same manner as the waxy matter of *Ceroplastes* commences in isolated waxy plates, afterwards increasing in area and coalescing. No definite glands can be distinguished as responsible for the secretion, just as no definite glands can be shown to be responsible for the dense waxy covering of *Ceroplastes*. In fact, these dorsal prominences, which may be more justly styled the stigmatic processes, are, with the caudal extremity, the only parts from which no lac is produced. Their extremities are provided with glands of the same nature as those appearing on the chitinous plates of the anal ring, the function of which appears to be the secretion of waxy filaments insulating those parts, preventing the accretion of lac there

and ensuring the permanence of the three orifices in the wall of the test, namely, the two stigmatic orifices for respiratory, and the anal orifice for excretory and sexual purposes.

The function of the remarkable dorsal spine still remains a mystery. There is apparently no analogous (nor homologous) organ in any other known coccid. It appears only in the adult stage, and might therefore be supposed to have some connection with the reproductive process. But Professor Cockerell has recently recorded species of *Tachardia* in which this organ is absent. It cannot therefore be an essential part. It is not a mere chitinous spine, but contains a duct connected with glandular bodies.

Tachardia fici, sp. nov.

Test of mature ♀ subglobular in isolated examples (pl. xix, fig. 4, often with supplementary globules of lac attached to the surface. Even where the insects are crowded together and the tests have become confluent, the original form can be roughly distinguished (fig. 4, a). Colour bright fulvous or castaneous. Apex pierced with the usual three apertures, the two stigmatic apertures closer together than their distance from the anal orifice : the anal aperture the largest surrounded by a prominent rim : the stigmatic apertures small and slightly sunk, usually blocked by white pulverulent wax. The remains of the larval test occupy a position between the stigmatic orifices. Surface roughened with numerous nodules of lac. Immature tests smaller, more oval and dorsally depressed. Early larval test oblong, with a more or less conspicuous median longitudinal rounded ridge. Diameter of a single isolated adult test averaging about 3.50 mm.

Test of ♂ (fig. 4, b.) irregularly oblong oval, slightly constricted on each side in front of the posterior orifice, with a median longitudinal rounded ridge representing the larval test : a large oval aperture at posterior extremity which, during the pupal stage, is closed by an operculum of lac. Colour dark reddish-brown. Length, 1.60 mm.

Adult ♀, after oviposition (figs. 4 c, d,) oblong oval : placed in an erect position, cephalic extremity downwards. Ventral area somewhat concave. Dorsal area rounded. Before oviposition the insect must have been globular, filling the test. Mouth parts with prominent spatulate processes arising immediately below the mentum. Antenna (fig. 4, e) small and vestigial : composed of 4 (?) joints which are vaguely indicated by darker chitinous bands : 3 or 4 stout hairs

at apex. The parts become so distorted during gestation that their true nature may be easily misunderstood. The position of the spiracles, for instance, is completely reversed. What was originally the anterior pair, finally assumes a position caudal of the true second pair and are placed dorsally. This change of position can be demonstrated by a study of the earlier stages, described below. It will be advisable therefore to speak of the dorsal and ventral spiracles, instead of the first and second pairs. Ventral spiracles small, close to rostrum. Dorsal spiracles large and conspicuous, situated at the base of the stigmatic processes (the so-called "lac-tubes"), which are prominent but rather short and truncate: the truncate extremity with a circular chitinous plate, in the centre of which is a shallow cavity with lobular outline bearing numerous minute circular pores and some 5 or 6 larger pit-like depressions communicating with chitinous cylindrical ducts (fig. 4, *f*). Anal process (fig. 4, *g*) very prominent, the apex strongly chitinous and surrounded by spines and spiniform prominences. Anal ring composed of four broad chitinous plates bearing 10 long stout hairs: the two ventral plates with two hairs each: the dorsal pair each with 3. Anal spine on a stout elongate fleshy tubercle: the spine dilated at base, and surrounded by some small chitinous points. Derm with some scattered catenulate groups of minute circular pores on the dorsal surface. Judging from the dried specimens, it is probable that both crimson and yellow forms occur, as is the case in the Ceylonese species *T. albizziæ*. Length from 2.50 to 4 mm.

Early adult female (fig. 4, *h*.) quite small and very different in form from the insect as it appears after gestation. It may be recognised as adult by the presence of the dorsal spine, which appears only in this final stage. The stigmatic processes and perforate plates are at first sessile, and the associated spiracles open dorso-laterally. The body is trilobate, the lateral indentations marking the openings of the dorsal stigmata which are placed in a more forward position than in the fully grown insect. Viewed from the side (fig. 4, *i*.), the anal process projects dorso-posteriorly, while the dorsal spine is directed upwards and forwards. Round the base of the anal process are some irregular crowded groups of glands, each group taking the form of a hollow sphere, the walls of which are closely set with the orifices. In macerated specimens it is difficult to interpret the proper relation of these glands to the surrounding tissues; but they correspond with an area of dense waxy matter which encircles the caudal extension in the living insect.

Female of second stage (fig. 4, *j*.), oblong-oval: cephalic extremity narrow and demarked from the thorax by a slight lateral indentation

on each side, from which proceeds a deep tubular invagination containing the anterior spiracle, this area being covered dorsally by the glandular plates. The second pair of spiracles opens on the ventral surface. The subrostral processes appear as fleshy rounded papillæ immediately below the mentum. There is no trace of the dorsal spine. The anal ring (fig. 4, *k.*) has 10 hairs each arising from a chitinous plate; but there is a tendency for 8 of the plates to combine in pairs, and, in some examples, they actually coalesce. The antennæ are very small and inconspicuous, even more vestigial than in the adult.

Young larva (fig. 4, *l.*) elongate-oval: either crimson or yellow, the two forms occurring in about equal numbers. Antenna with 6 joints: 3rd long and dilated at extremity: 6th very irregularly fusiform: 5th with two very long whip-like hairs. Mouth-parts large and conspicuous. Legs well developed: tarsal digitules set one behind the other (fig. 4, *m.*), a single hair-like ungual digitule. Anal ring with 6 hairs, each arising from a small circular plate. Spiracles small and inconspicuous: a perforate chitinous plate covering the anterior pair.

Habitat: On the small terminal branches of *Ficus religiosa* and *F. bengalensis*; Monghyr. (coll. Dr. Geo. Watt, Register No. 14916).

This species is most closely related to the lac insect of commerce (*Tachardia lacca*, Kerr.); differing from that species principally in the much smaller, more globular, and more isolated tests of the adult female. The structural differences of the insect itself are more of degree than of quality. The stigmatic processes are shorter and more truncate than those of *T. lacca*, and have fewer depressed spots on the extremity. The antennæ are more developed: in *T. lacca* they are mere truncate tubercles, without trace of segmentation. From *T. mexicana* it may be distinguished by the form of the test and contained insect, which is 6-lobed in that species. From other described species it is more easily separable.

Genus *Monophlebus*, Leach.

The sub-family *Monophlebinæ* was defined by Signoret as containing all those species having 11-jointed antennæ in the adult female. But at that time not a single adult female of any species of *Monophlebus* proper appears to have been known to Signoret. Maskell has since described *M. crawfordi*, with 9-jointed antennæ, and *M. fuscus* which has only 7 joints. Signoret himself described what he supposed

to be an immature female of *M. leachii*, with 7-jointed antennæ: but, as suggested by Maskell, this may very possibly have really been an adult. It is evident that the characters of the female *Monophlebus* have been taken too much on trust. No female *Monophlebus* has as yet been described having more than 9 joints in the antennæ. I am now able to describe the females of two new species, in which the sexually adult insects have 8-jointed antennæ. They were both found by Mr. E. P. Stebbing, Entomologist to the Imperial School of Forestry, Dehra Dun, North-Western Provinces. I have much pleasure in naming one of them after its discoverer.

Monophlebus Stebbingi, sp. nov.

Adult ♀ (pl. xx, fig. 5) robust. Margin somewhat flattened and forming a distinct lateral keel. Median dorsal area tumescent: divisions of segments well defined. Colour, slaty-gray, thickly dusted with white mealy powder. Legs and antennæ black. Margin with irregular fringe of longish black hairs: the whole ventral surface covered with a short pubescence, denser on the margins and inter-segmental regions. Both dorsum and ventral surface with numerous circular pores, some with single, some with double orifice (fig. 5, *a*), the orifices guarded by small raised points. Antenna (fig. 5, *b*.) with 8 joints: first seven subequal in length, 3rd sometimes longer: 8th longer than previous two together: all the joints with many blackish hairs. Legs stout, spiny: tarsus short, scarcely half the length of the tibia: claw long and stout, with a pair of simple hair-like digitules. Anal aperture on dorsum, at some distance from extremity, surrounded by a group of stout hairs. Length of early adult female (taken in coitû with the male), 8.50 mm. Breadth, 4.50 mm. Older examples attain a considerably larger size. The largest I have examined measures 13 mm. by 8.50 mm., and it is possible that others may exceed these dimensions.

Adult ♂ (fig. 5, *c*.) dull red: notal and sternal plates black: the whole body dusted with mealy powder, giving it a pruinose appearance: a lunate pale patch in the centre of mesonotum and a pale space between the mesonotal plates and the scutellum. Legs and antennæ black: wings fuscous, corrugated, with two white creases, one on each side of the discal nervure. Halteres with 5 stout hooked bristles at extremity. Antenna 10-jointed: 3rd to 9th each with three nodes, 10th with four nodes: each node with a whorl of long hairs. Eyes large, compound: a single ocellus on the dorsal

surface at inner margin of each eye (fig. 5, *d*). Abdomen with 3 elongate fleshy hairy processes on each side: the first shortest, the third longest. Genital sheath not projecting beyond the posterior margin of abdomen: penis usually partially everted, densely clothed with short reversed hairs. Length: 5 mm. Expanse: 11.50 mm.

Habitat: On stems and branches of the "Sal" tree (*Shorea robusta*). It is said to be a pest of some consequence, as it "weakens leading shoots of young saplings and the smaller branches of older trees, tending to check the spring growth of the tree". It makes its appearance about the end of January.

M. stebbingi may be distinguished from *M. crawfordi* by the three nodes on the antennal joints in the male, 2 nodes only being present in the same parts of *M. crawfordi*.

It is possible that the present insect may be eventually proved to be identical with *M. fabricii*, Westw., from Sumatra: but the description of that species is so meagre and inadequate that, taking into consideration also the difference in locality, I hesitate to accept that description.

Monophlebus dalbergiae, sp. nov.

Adult ♂ considerably larger than *M. stebbingi*. Abdomen with 4 elongate fleshy appendages on each side (fig. 6). Halteres with 10 stout hooked bristles (fig. 6, *a*). Colour and form otherwise similar to *M. stebbingi*. Length, exclusive of appendages, 7 mm. Expanse: 17 mm.

Adult ♀ differs only from *M. stebbingi* in the denser and stronger pubescence on the under surface. Size of early adult, 8.50 × 4.75 mm. Fully grown examples would probably double these dimensions.

Habitat: On *Dalbergia sissoo*: Sutlej Valley, Punjab, India.

Differs from *M. saundersi*, Westw. in its larger size (the ♂ of *Saundersi* has an expanse of 14 to 15 mm. only, and a length of 4 to 5 mm.): and in the absence of the small tubercle on each side at the base of the penis—(See "Essai sur les cochenilles", Pl. xix, fig. 3).

Other new records for India, since the publication of my last paper, are:—

From Mr. H. W. Peal—

Aspidiotus trilobitiformis, Green: on unidentified plant, Calcutta. This species infests cultivated Mango plants in Mauritius. The present examples are extensively parasitized, so there is little fear of the insect becoming a pest in India.

Aspidiotus lataniæ, Sign, on unidentified plant, Calcutta. This is the insect wrongly determined as *A. cydoniæ*, in "Coccidæ of Ceylon," Part I. (See also Journ. Bomb. Nat. Hist. Soc., Vol. XIII, No. I.)

Parlatoria zizyphi, Lucas, on *Citrus* plants, Ballygunge, Calcutta.

Dactylopius citri, Risso. on *Erythrina*, Calcutta.

It is probable that the earlier records of *D. adonidum* are really referable to the present species.

Mr. Stebbing has sent me examples of *Fiorinia theæ*, Green, infesting Olive plants, from the Sutlej Valley, N.-W. Himalayas.

Dactylopius sacchari, Cockerell, has been received from Mr. I. Burkill, affecting sugarcane from Poona. The insects were crowded beneath the sheathing leaves, just above the nodes of the plant. This species was originally described by Prof. Cockerell from Trinidad. Maskell identified the same insect from specimens collected in Mauritius. It differs from *Ripersia sacchari*, Green (*Indian Museum Notes*, vol. V, No. 2), in the presence of 7 joints in the antennæ: in its smaller size: and in the simple anal ring.

Eriococcus paradoxus, var. *indica*, Mask. (*Indian Museum Notes*, vol. IV, No. 4), was accidentally omitted from my earlier list of Indian *Coccidæ*.

Cerococcus ficoides, Green. Collected by Dr. George Watt on Tea-plants in the Duars. Was described and figured in "The Entomologist's Monthly Magazine," October 1900.

Chionaspis decurvata, Green, is described in another part of the present number.

The total additions to my first list will therefore be as follows:—

DIASPIDINÆ—

Aspidiotus glomeratus, Green.

„ *trilobitiformis*, Green.

„ *lataniæ*, Sign.

Parlatoria zizyphi, Lucas.

Chionaspis decurvata, Green.

LECANIINÆ—

Lecanium imbricans, Green.

Inglisia bivalvata, Green.

Aclerda japonica, Newst.

ASTEROLECANIINÆ—

Cerococcus ficoides, Green.

DACTYLOPHINÆ—

Dactylopius citri, Risso.„ *sacchari*, Ckll.*Ripersia sacchari*, Green.*Eriococcus paradoxus*, var. *indica*, Mask.

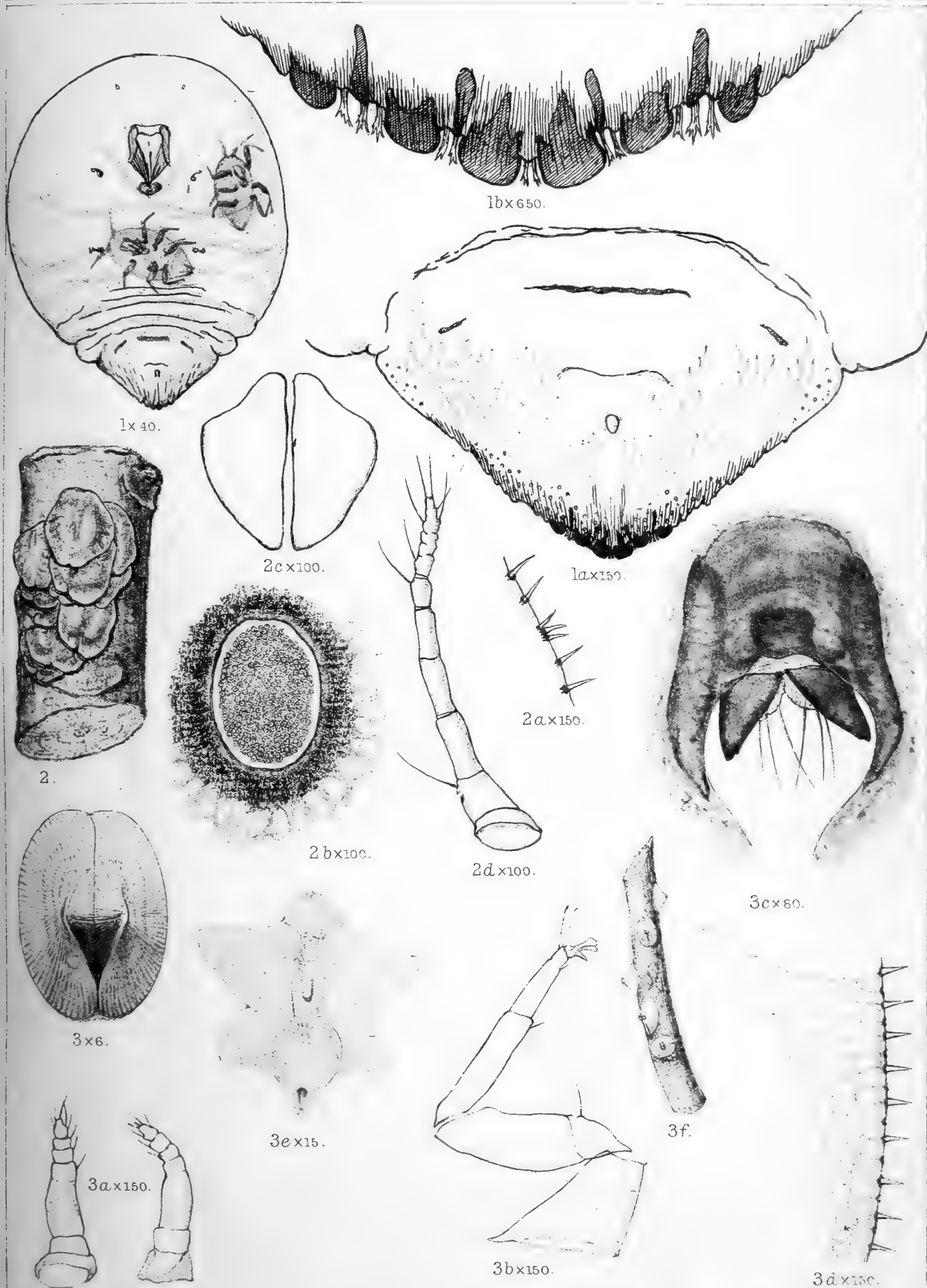
TACHARDIINÆ—

Tachardia fici, Green.

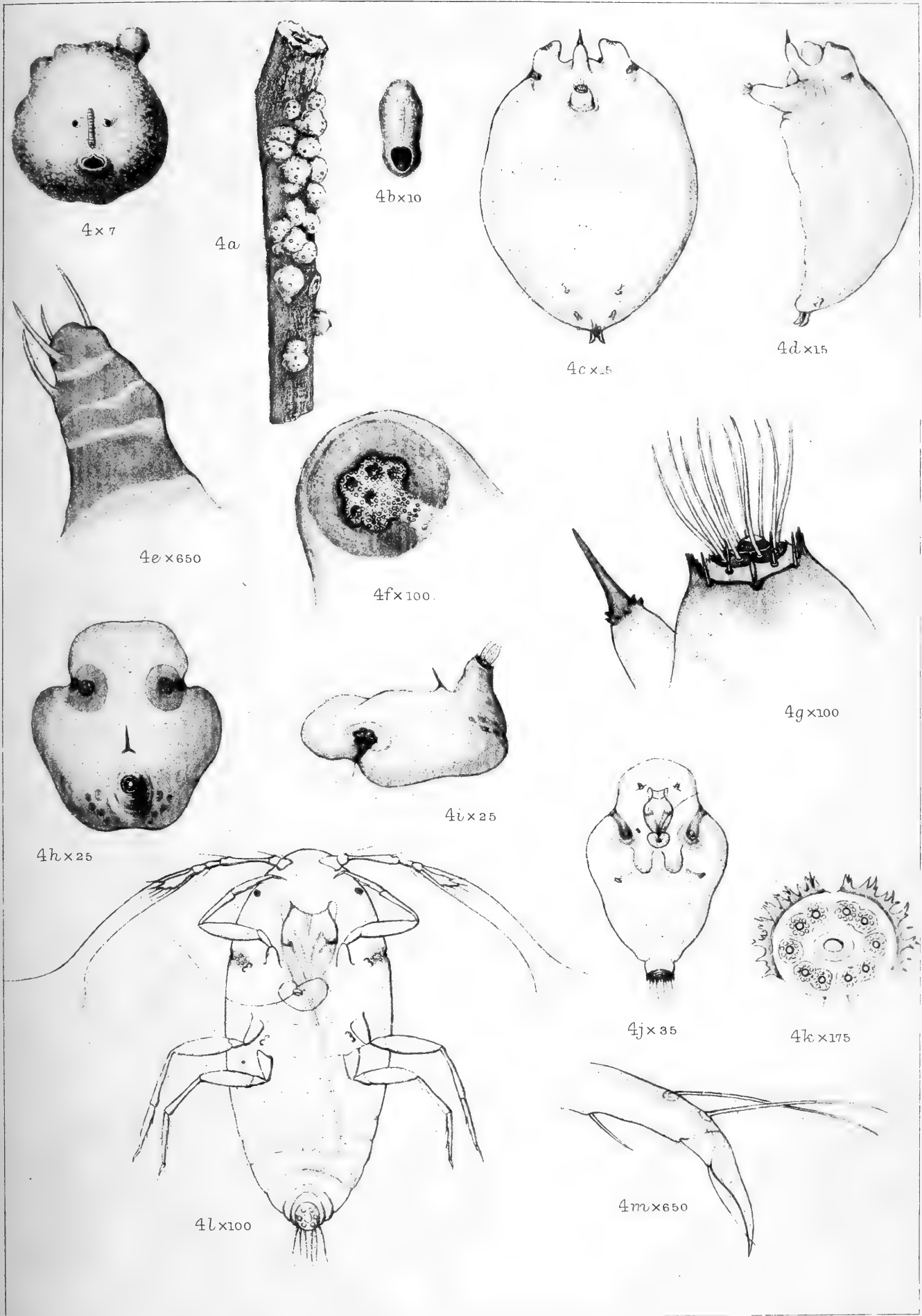
MONOPHLEBINÆ—

Monophlebus stebbingi, Green.„ *dalbergiæ*, Green.

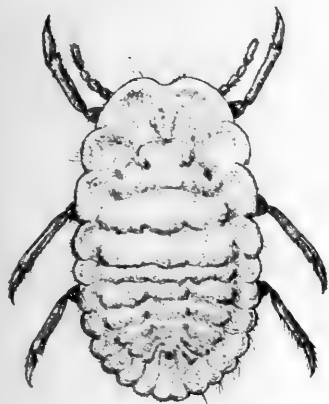




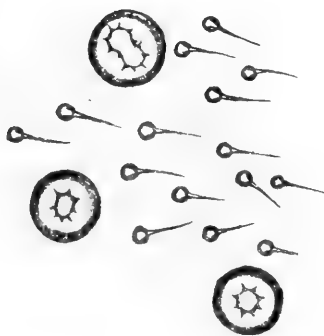




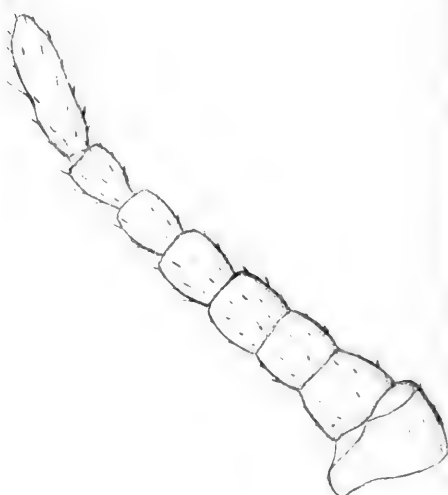




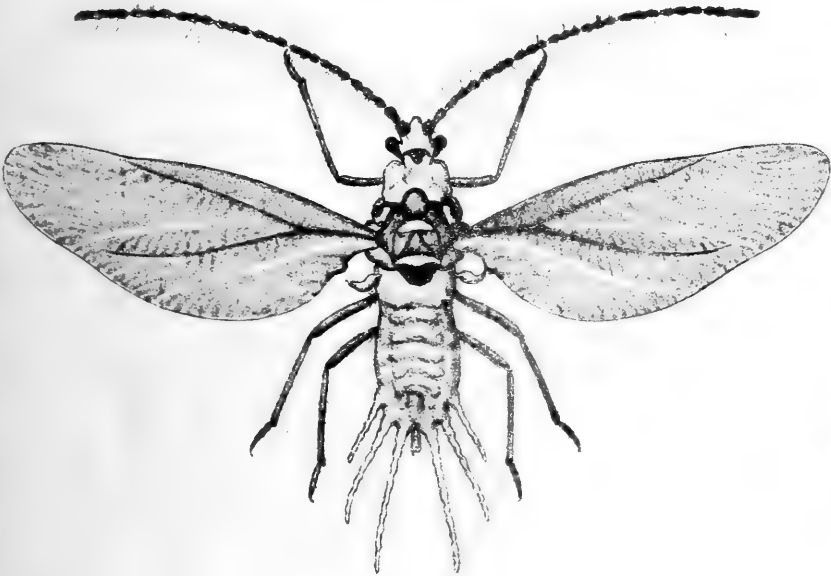
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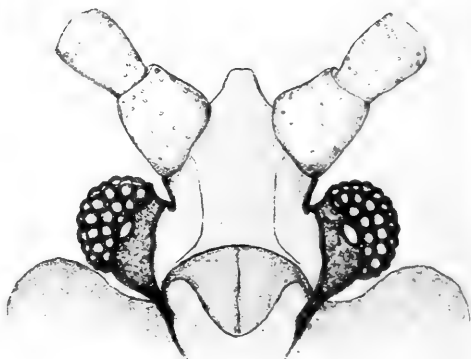
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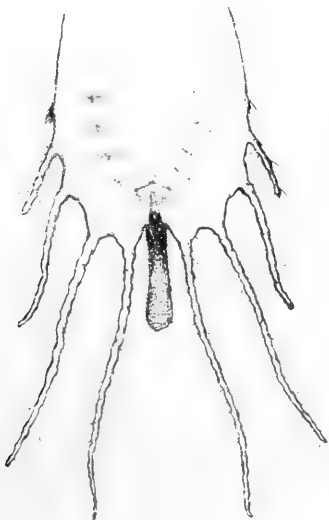
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